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DISCIPLINED DECISION MAKING IN AN INTERDISCIPLINARY ENVIRONMENT: SOME IMPLICATIONS FOR CLINICAL APPLICATIONS OF STATISTICAL PROCESS CONTROL

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This paper explores some of the implications the statistical process control (SPC) methodology described by Pfadt and Wheeler (1995) may have for analyzing more complex performances and contingencies in human services or health care environments at an organizational level. Service delivery usually occurs in an organizational system that is characterized by functional structures, high levels of professionalism, subunit optimization, and organizational suboptimization. By providing a standard set of criteria and decision rules, SPC may provide a common interface for data-based decision making, may bring decision making under the control of the contingencies that are established by these rules rather than the immediate contingencies of data fluctuation, and may attenuate escalation of failing treatments. SPC is culturally consistent with behavior analysis, sharing an emphasis on data-based decisions, measurement over time, and graphic analysis of data, as well as a systemic view of organizations.

DESCRIPTORS: statistical process control, decision making, behavioral systems analysis, rule-governed behavior, establishing operations

Deming's (1982, 1986) management theory and statistical process control (SPC) methods have had a widespread, international impact. Although Deming's theory was developed in manufacturing organizations, the principles and practices of SPC have been applied successfully to service organizations (Zeithaml, Parasuraman, & Berry, 1990), and recently have been extended to human services and health care organizations (Pfadt & Wheeler, 1995). Besides the practical advantages that may result from applying SPC methods to clinical practice detailed by Pfadt and Wheeler (1995), certain analytic advantages may also follow from adopting a total quality management perspective, specifically in terms of organizational analysis and decision making. In the spirit of Mawhinney's (1986, 1987) seminal work in behavior analysis and SPC, this paper explores some of the implications SPC (Pfadt & Wheeler, 1995) may have for analyzing more complex performances and contingencies in a human services or health care environment at an organizational and systemic level. Systems level thinking and analysis are hallmarks of Deming's (1982, 1986) approach to management; they are also an important component of organizational behavior analysis (Brethower, 1982; Gilbert, 1978; Krapfl & Gasparotto, 1982). Applying SPC methods to an organization often raises questions about system-wide functioning and integration that may otherwise remain as tacit assumptions about standard operating procedures, and provides clues to some intriguing answers.

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Systems and Service Delivery

A patient entering a health care or human services institution for treatment is introduced into a system. This system is comprised of many specialized subsystems that interact to deliver the various forms and modes of treatment necessary to improve the patient's overall health and welfare. In most modern health care institutions, these specialized subsystems are represented by various allied health disciplines (e.g., anesthesiology, behavior analysis, nursing, physical therapy, social work, etc.) that provide treatment based on their particular expertise. In the-

ory, such an interdisciplinary approach is both effective and efficient. Specialized professionals bring their proficiencies to bear on a common problem, jointly develop and implement treatment, yet do not dedicate the full resources of one or a few highly trained (and often well paid) individuals to one patient. Some evidence exists to support the efficacy of such an interdisciplinary team approach (Bithoney, McJunkin, Michalek, & Snyder, 1991; Chatoor, Kerzner, Zorc, & Persinger, 1992). Although the concept of such an interdisciplinary team approach appears to be appealing, implementing and evaluating treatment in such a context is often fraught with difficulties and dilemmas.

Organizational Establishing Operations

As defined by Michael (1982), an establishing operation is an event that both alters the effectiveness of a reinforcer and evokes behavior that has been followed by that reinforcer. Establishing operations may be events such as deprivation (as originally discussed by Michael), but can also be more enduring states of nature such as formal organizational structures. Organizational structures are generally understood to be the regularized aspects of relationships among people in an organization (Scott, 1992); or, in more behavioral terms, organizational structures are the framework for the rules and contingencies operating in an organization. Organizational structures specify to a large extent which individuals control certain contingencies of reinforcement and punishment and the extent to which these contingencies may operate. The arrangement of contingencies in many common organizational structures has been studied extensively and is well documented (Daft, 1992).

Modern health care and human services organizations are usually functional and vertical in structure, and integrating health care delivery within these organizations is of growing concern (Devers et al., 1994). For example, it is common to find many institutions organized (as illustrated in the top portion of Figure 1) into departments of nursing, psychiatry, social work, and the like that are responsible for managing the delivery of their specialized services. Information, authority, and contingencies flow downward (Daft, 1992). Formal cross-disciplinary communications require information to flow from one discipline to another through their respective heads to subordinate staff in a top-down fashion. Denizens of these departments are most often professionals whose behavior is more influenced by the contingencies of their respective professions than by those of the organization (Morrow & Goetz, 1988). Such a vertical, functional structure coupled with high professionalism is intended to provide the context for intensive, focused expert treatment. The tacit assumption in this structural arrangement is that optimal patient care will result from each specialization aggressively pursuing its own professional interests and agenda (not unlike the assumptions underlying the adversarial system in United States jurisprudence). However, it is often the case that, although individual specialties may optimize their particular practice, the whole of patient care may be less than the sum of its parts, or as Rummler and Brache (1990) state "*this functional optimization often contributes to the suboptimization of the organization as a whole*" (p. 6, italics theirs). This apparent paradox is not limited to health care or human services settings. Lee Iacocca discovered an extreme example when he took control of Chrysler Motors; each department worked independently toward functional optimization with less than full optimization of the organizational system as a whole, or in his words, "What I found at Chrysler was 35 vice-presidents, each with his own turf. . . . Everybody worked independently. I took one look at that system and nearly threw up. That's when I knew I was in really deep trouble" (Iacocca & Novak, 1984, pp. 152–153).

A common solution to the problems that accompany vertical structure and functional optimization is the establishment of cross-functional (in industry) or interdisciplinary (in hu-

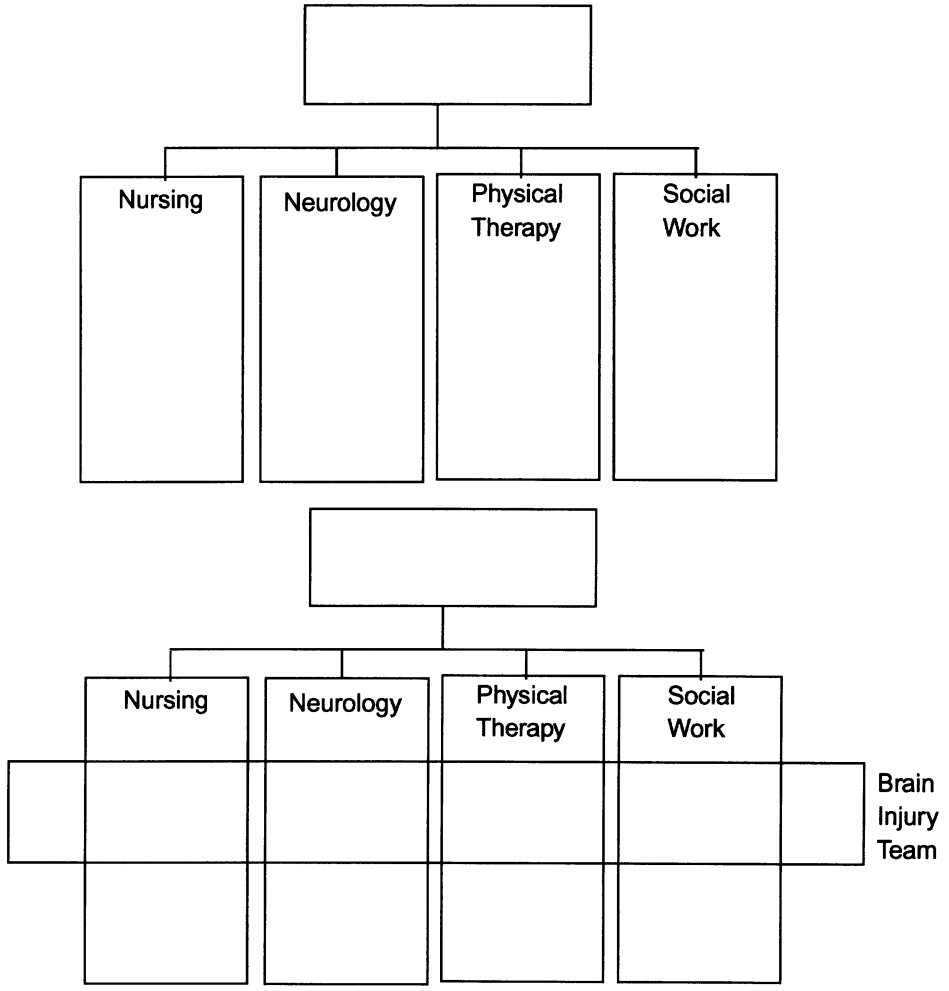

Figure 1. Typical organizational structure (top) and typical organizational structure of an interdisciplinary team (bottom).

man services and health care) teams. An interdisciplinary team in a health care setting is a permanent task force comprised of representatives from each specialty or discipline whose expertise may contribute to the patient's care and recovery. As illustrated in the bottom half of Figure 1, an interdisciplinary team established to rehabilitate brain-injured adults, for example, would include professionals from nursing, neurology, physical therapy, and social work, among others. An interdisciplinary team enables horizontal transmission of information; however, the vertical control of organizational contingencies and authority remains.

Given that the professional behavior of specialists in an interdisciplinary team is controlled first by the contingencies of their profession and second by the contingencies of the organization, control exerted by the team is often a distant third. This is not an unforeseen or unintended state of affairs. According to current organizational theory, professionals' advanced education and training are expected to establish patterns of behavior that act as a substitute for formal managerial control (Daft, 1992; Podsakoff, Williams, & Todor, 1986; Scott, 1992). In the case of health care, this type of professional control is critical because management often does not

have the knowledge to evaluate or control the practice of individual disciplines.

The extent to which professional training is expected to substitute for management oversight and to which the pursuit of singular professional excellence is valued is often reflected in their respective literatures. For example, Giddan, Trautman, and Hurst (1989) and Sholle-Martin and Alessi (1990) describe the roles of a speech and language clinician and occupational therapist, respectively, in an interdisciplinary team. What is remarkable about these two examples is the extent of the delineation and defense of specialized niches for their respective professions and the provision of rules for maintaining these niches. Little attention is directed to integration, although it is recognized that this can lead to "value conflict" between team members such as physicians and social workers (Roberts, 1989). Thus, interdisciplinary teams are loosely coupled systems (Scott, 1992) in which some conflict and confusion may be expected, and the goals and criteria for success of each member may diverge (Koff, DeFriese, & Witzke, 1994).

The Data Dilemma

Perhaps a particularly strong point of contention in interdisciplinary teams is that of collecting, analyzing, and interpreting data. Standards for what constitute acceptable data vary widely among disciplines, as do practices for making decisions based on data. However, coordination and integration of treatment demand that common outcome data guide the decision processes. It is often assumed that a medical interdisciplinary team embraces equivalent relations among the members, broad-based participation, and consensual decision making; however, research has shown that this is not the case (Fiorelli, 1988). Instead, autocratic decision making is the norm. Unfortunately, this may result in the interdisciplinary team as a whole focusing on a "least common denominator" form of data that neither enlightens nor offends, but is acceptable to all involved. More focused data are reserved for decision making within individual disciplines. This may occur frequently in very loosely coupled teams in which the patient is the only locus of mutual contact. Information is exchanged in the form of short progress notes that are entered into a patient's chart according to the practice of each particular discipline, but these may be minimally informative to those from other disciplines. This dilemma can be compounded when various disciplines are pursuing equally important but sometimes competing goals for a patient.

The SPC Solution

An effective solution to the difficulties arising in a vertical, functional, and highly professional organization is *not* an escalation of management control, nor is it a horizontal restructuring of the organization into teams under the direction of a manager (which is often impractical or uneconomical) or other forms of management from "without." Instead, it is probably more beneficial to the system and those it serves to maintain the advantages of high degrees of professionalism and the accompanying contingencies, and to use them as the cornerstone for increased integration of the various subsystems as a form of management from "within." Because attending to and acting with respect to data are common practices in most health care professions, the SPC technology described by Pfadt and Wheeler (1995) may be the mechanism necessary to link the various subsystems of an interdisciplinary team. Specifically, SPC provides a second locus of mutual contact with a common, practical, and standardized method for classifying, collecting, analyzing, and acting on data, as well as a systems perspective for solving problems. The SPC approach emphasizes the systematic inclusion of information from all members of a treatment team.

Professional decision making is not arbitrary, capricious, or uninformed, but is based on some type of data or objective criteria derived from a specialized knowledge base. SPC technology

can capitalize on previously established professional repertoires of attending to and responding to data. The purpose of SPC applications is to bring the behavior of each member of the interdisciplinary team under the control of the same set of discriminative stimuli (Saunders & Saunders, 1994), establishing disciplined decision making in an interdisciplinary environment. SPC methodology does not prescribe how multiple treatment goals, disciplinary prerogatives, or other issues should be prioritized; rather, it provides a means for integrating efforts and evaluating progress toward treatment goals once such matters have been settled. Because SPC provides a set of standard decision rules for discriminating "signals" from "noise" in a system, the decisions of those in the system should be less governed by the immediate contingencies of data fluctuation than by the more distant contingencies established by these rules (see Cerutti, 1989); in essence, SPC can serve to buffer individual decision makers from overreacting to immediate contingencies and experiencing the frustrating consequences of Type I errors described by Pfadt and Wheeler (1995).

The systems perspective of SPC deemphasizes subsystem optimization in favor of optimizing the performance of the system as a whole. The problem-solving tools of SPC (Wheeler & Chambers, 1992) stress looking to the system rather than the individual for causes of variability. Besides minimizing the aversive consequences of assigning blame to individuals, two other benefits may accrue from systems-level problem solving. First, the most impressive gains in performance may well result from systems-level interventions; it is contended that up to 85% of the variability in work performance is due to the system, and 15% is due to the individual (Deming, 1982; Rummler & Brache, 1990). Second, a systemic view is necessarily integrative, recognizing the dynamic interrelationships of various subsystems. In the case of health care, the behavioral, developmental, and physiological functioning of an individual patient is interdependent; treating or attending to one in isolation from the others is naive at best and dangerous at worst. Kerwin, Osborne, and Eicher (1994) provide a case example and a methodology for examining how these dynamic interrelationships may emerge in the context of coordinated care.

Knowing When to Quit

If the definition of acceptable data and generally accepted principles for making decisions from data are not well established, success or failure of a particular treatment cannot be ascertained. The control charts and decision rules discussed by Pfadt and Wheeler (1995) provide judgment aids to help determine when to implement treatment, continue successful treatment, and, most important, discontinue unsuccessful treatment. This latter decision is especially critical. In the absence of any other rules or stimuli besides the feedback from a particular course of action, decision makers do not discontinue or change their actions at the first signs of failure; rather, they often persist, and even escalate their efforts (Hantula, 1992). Such persistence and escalation in a course of action have been shown to occur during periods of failure or no returns following experience with unpredictable, intermittent reinforcement schedules (Goltz, 1992; Hantula & Crowell, 1994). According to Goltz (1992, Experiment 2), such intermittent reinforcement schedules are not necessarily limited to laboratory-controlled contingencies; life appears to operate much like a variable schedule.

Providing treatment and evaluating its results are clearly uncertain and equivocal enterprises. The data in Figure 1 of Pfadt and Wheeler (1995) appear to be quite equivocal (described as "noisy" by the authors); indeed, these data were chosen by the authors for that purpose. If these data were treatment data, it is not clear whether or not the treatment is effective and should be maintained or if it should be changed. However, when viewed through the lens of the control chart of their Figure 2, the signals are much clearer, and more appropriate

treatment decisions may be rendered. In the absence of judgment aids such as the control chart, when clear success and failure signals are not apparent, the tendency is to continue, rather than to withdraw. In such cases, it is often held that another day's exposure to treatment contingencies may turn the situation around. If treatment is discontinued, the probability of success with that treatment is zero; however, continuing treatment allows for some nonzero probability of success, thereby establishing a strong incentive to wait (Dixit, 1992). Thus, as Bowen (1987) contends, continuing or escalating a failing treatment may be largely a result of equivocal feedback. Bowen further speculated that providing judgment aids and standards may reduce feedback equivocality, thus attenuating the tendency to escalate; this proposition was recently confirmed experimentally by DeNicolis (1995).

Clinical applications of SPC appear to provide a unique perspective and methodology that may help to meliorate some often unspoken yet important structural, professional, and judgmental dilemmas in current health care organizations. Behavior analysts have much to gain by adopting SPC as a clinical tool. The major procedures of SPC—such as the emphasis on standard and replicable measurement, collecting data over time, and plotting data as a judgment aid—are consistent with those of behavior analysis (Mawhinney, 1986, 1987). The metatheoretical stance of systems analysis in SPC is also compatible with behavior analysis (Krapfl & Gasparotto, 1982). Thus, SPC is amenable to the professional culture of behavior analysis. If SPC is adopted throughout a health care system, it appears that behavior analysts working in that system would be at a particular advantage, and perhaps some of the standard practices and skills of clinical behavior analysts may become highly valued.

Although arguments in favor of SPC are often quite compelling (Deming, 1982, 1986; Mawhinney, 1986; Pfadt & Wheeler, 1995), SPC is not a panacea. As with any form of organizational restructuring or intervention, SPC has both strong and weak points; however, the weak points of SPC have gone largely unexplored. Sitkin, Sutcliffe, and Schroeder (1994) argue that SPC is inappropriate in environments characterized by high task uncertainty; other limits of SPC remain to be seen. Perhaps one of the greatest challenges to clinical SPC may be in adapting the standard decision rules elucidated by its proponents (e.g., Pfadt & Wheeler, 1995) to clinical settings. Patients in a health care system are not widgets, nor are they "customers" in the sense of other SPC applications (Zeithaml et al., 1990). The rules and tools of SPC may ultimately be inappropriate for clinical decision making in which the downside risks (e.g., death) may demand different criteria. Nonetheless, given that SPC and behavior analysis appear to be complementary viewpoints of organizational analysis (Mawhinney, 1987; Saunders & Saunders, 1994), and behavior-analytic applications in organizations have been markedly successful (O'Hara, Johnson, & Beehr, 1985), there is reason to share the optimism of SPC's advocates.

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